# N-Channel Enhancement Mode Power MOSFET

## Description

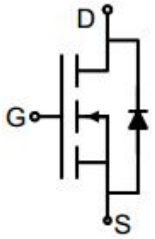
The G3404 uses advanced trench technology to provide excellent $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

## General Features

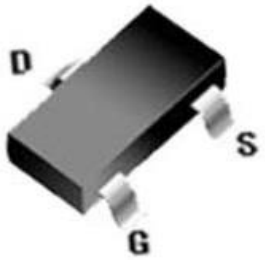
- $V_{DS}$ 30V
- $I_D$ (at $V_{GS}$ = 10V) 5.6A
- $R_{DS(ON)}$ (at $V_{GS}$ = 10V) < 22mΩ
- $R_{DS(ON)}$ (at $V_{GS}$ = 4.5V) < 30mΩ
- 100% Avalanche Tested
- RoHS Compliant

## Application

- Power switch
- DC/DC converters




Schematic diagram




SOT-23

## Ordering Information

| Device | Package | Marking | Packaging |
|---|---|---|---|
| G3404 | SOT-23 | G3404 | 3000pcs/Reel |

## Absolute Maximum Ratings $T_C$ = 25ºC, unless otherwise noted

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Continuous Drain Current | $I_D$ | 5.6 | A |
| Pulsed Drain Current (note1) | $I_{DM}$ | 22.4 | A |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Power Dissipation | $P_D$ | 1.4 | W |
| Single pulse avalanche energy （note2） | $E_{AS}$ | 12 | mJ |
| Operating Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | -55 To 150 | ºC |

## Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient, t≤10s | $R_{thJA}$ | 89 | ºC/W |

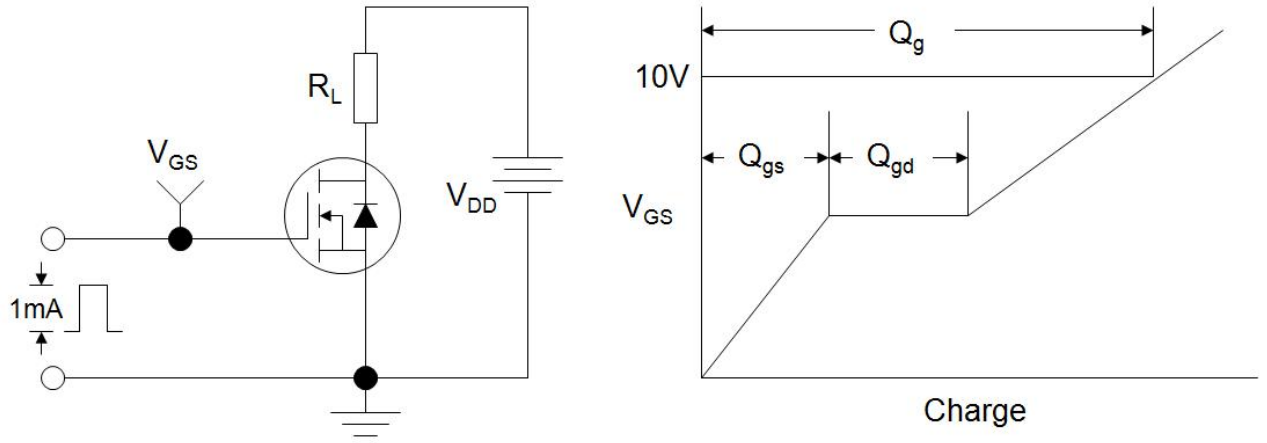
**Specifications** $T_J$ = 25ºC, unless otherwise noted

| Parameter | Symbol | Test Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| **Static Parameters** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 30 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 30V, $V_{GS}$ = 0V | -- | -- | 1 | μA |
| Gate-Source Leakage | $I_{GSS}$ | $V_{GS}$ = ±20V | -- | -- | ±100 | nA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1.0 | 1.5 | 2.0 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 3A | -- | 18 | 22 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 3A | -- | 23 | 30 | |
| Forward Transconductance | $g_{FS}$ | $V_{GS}$ = 5V, $I_D$ = 3A | -- | 7 | -- | S |
| **Dynamic Parameters** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 15V, f = 1.0MHz | -- | 568 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 62 | -- | |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 54 | -- | |
| Total Gate Charge | $Q_g$ | $V_{DD}$ = 15V, $I_D$ = 3A, $V_{GS}$ = 10V | -- | 16 | -- | nC |
| Gate-Source Charge | $Q_{gs}$ | | -- | 2 | -- | |
| Gate-Drain Charge | $Q_{gd}$ | | -- | 1.8 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = 15V, $I_D$ = 3A, $R_G$ = 3Ω | -- | 4 | -- | ns |
| Turn-on Rise Time | $t_r$ | | -- | 26 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 15 | -- | |
| Turn-off Fall Time | $t_f$ | | -- | 24 | -- | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | $T_C$ = 25ºC | -- | -- | 5.6 | A |
| Body Diode Voltage | $V_{SD}$ | $T_J$ = 25ºC, $I_{SD}$ = 3A, $V_{GS}$ = 0V | -- | -- | 1.2 | V |
| Reverse Recovery Charge | Qrr | $I_F$ = 3A, $V_{GS}$ = 0V di/dt=100A/us | -- | 1 | -- | nC |
| Reverse Recovery Time | Trr | | -- | 12 | -- | ns |

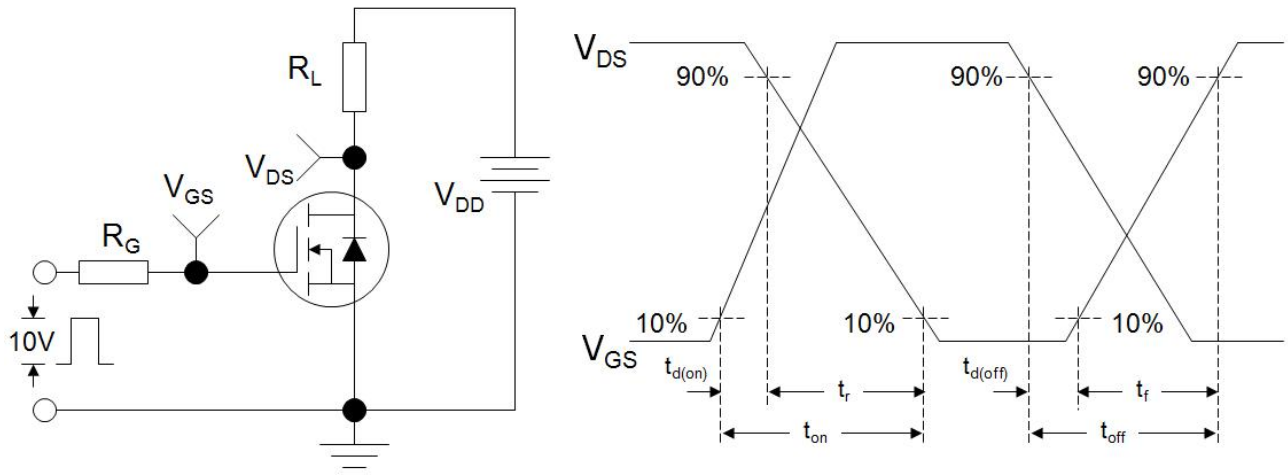
**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=30V,VGS=10V,L=0.5mH,Rg=25Ω
   The table shows the minimum avalanche energy, which is 30mJ when the device is tested until failure
3. Identical low side and high side switch with identical $R_G$

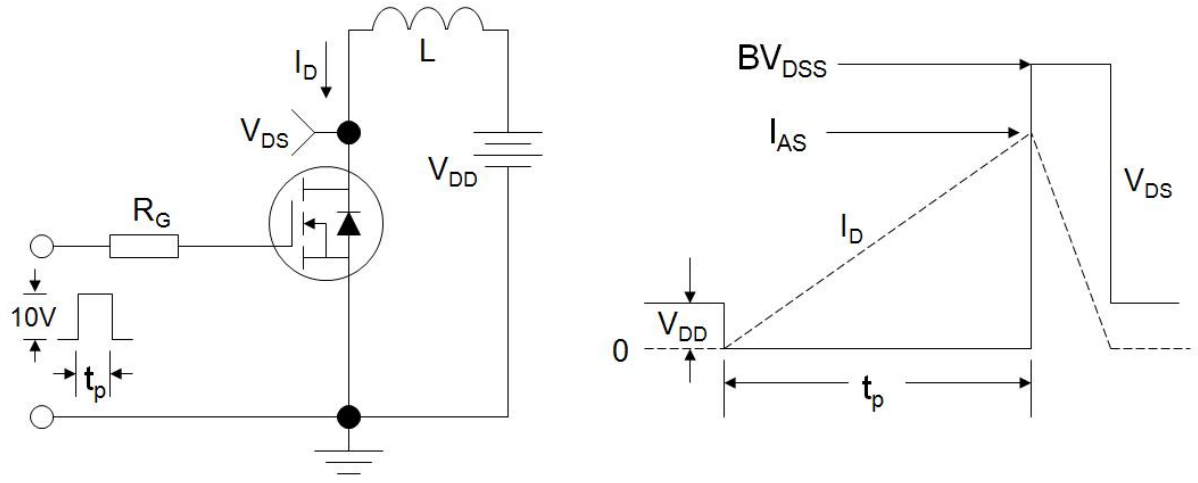
**Gate Charge Test Circuit**




**Switch Time Test Circuit**




**EAS Test Circuit**



## Typical Characteristics $T_J$ = 25ºC, unless otherwise noted

**Figure 1. Output Characteristics**

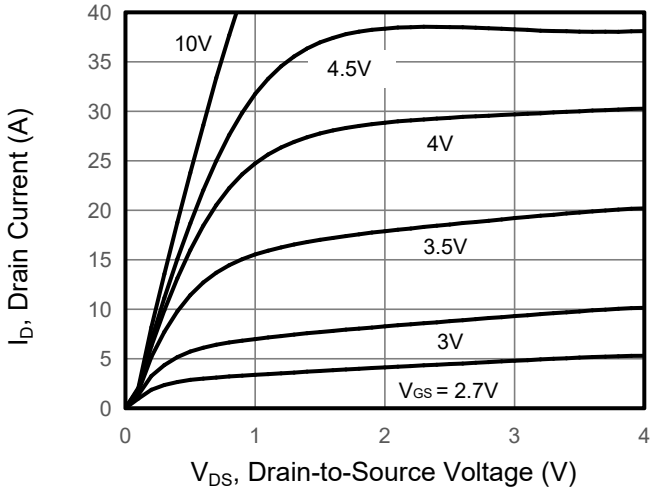



**Figure 2. Transfer Characteristics**

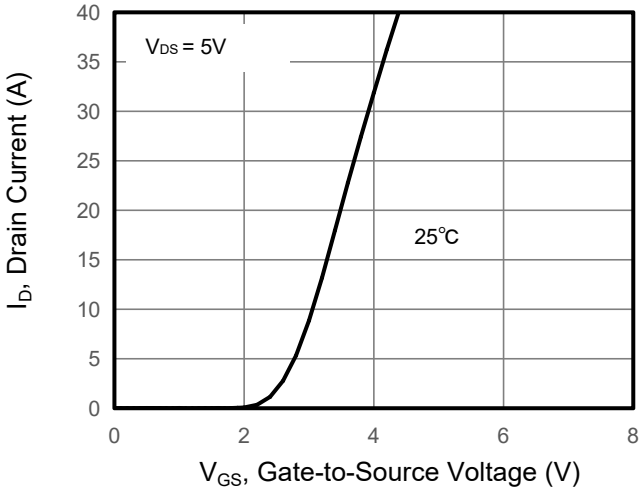



**Figure 3. Drain Source On Resistance**

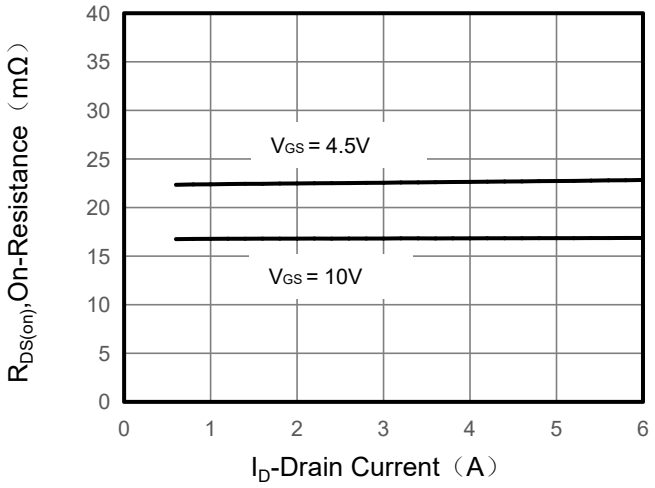



**Figure 4. Gate Charge**

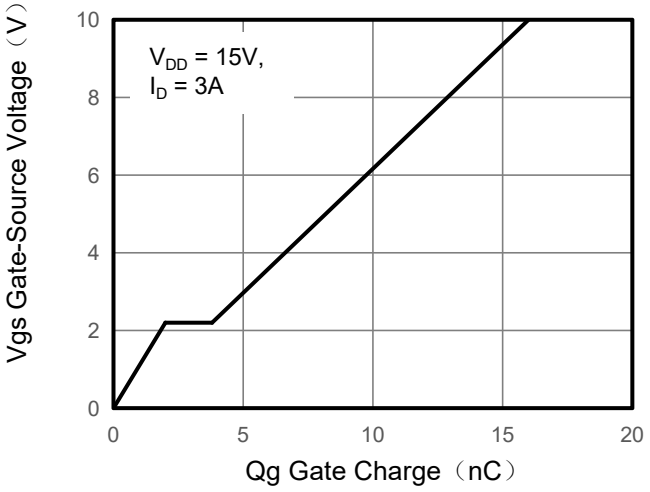



**Figure 5. Capacitance**

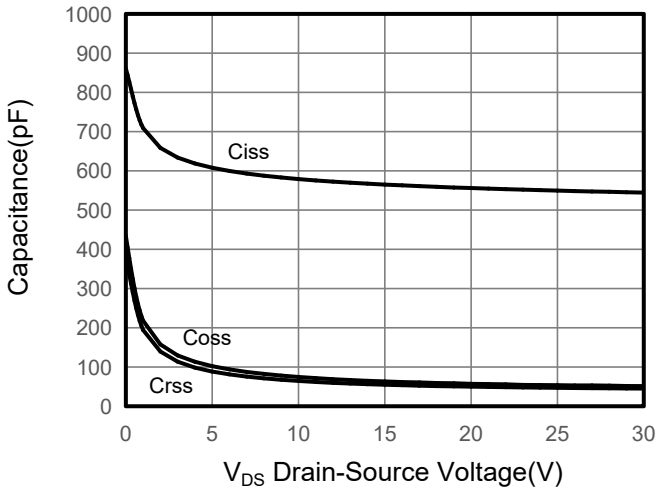
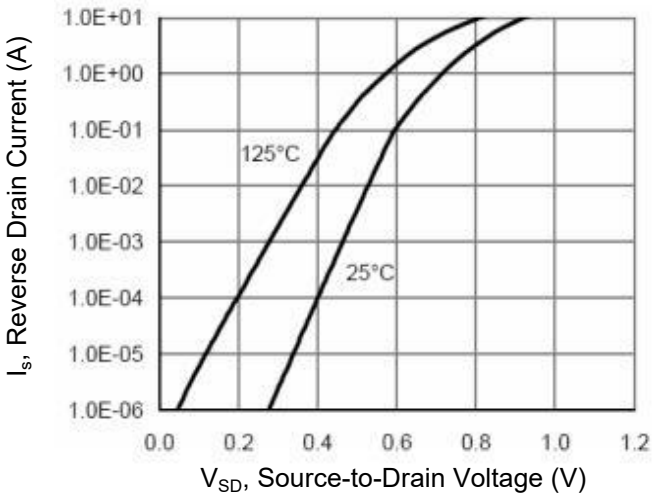



**Figure 6. Source-Drain Diode Forward**



**Typical Characteristics** $T_J$ = 25ºC, unless otherwise noted

**Figure 7. Drain-Source On-Resistance**

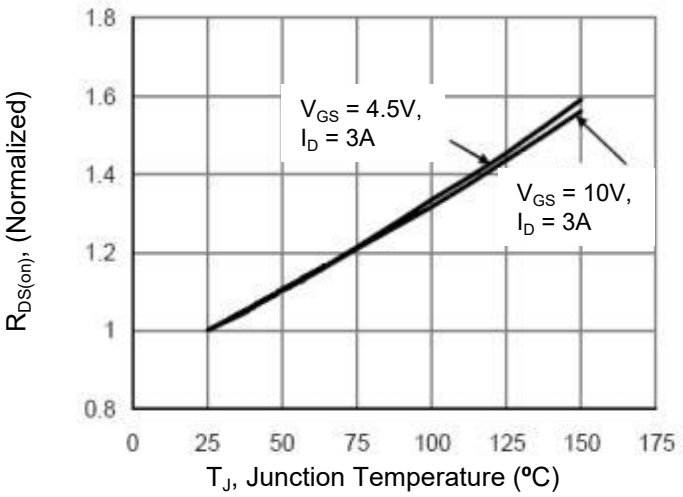



**Figure 8. Safe Operation Area**

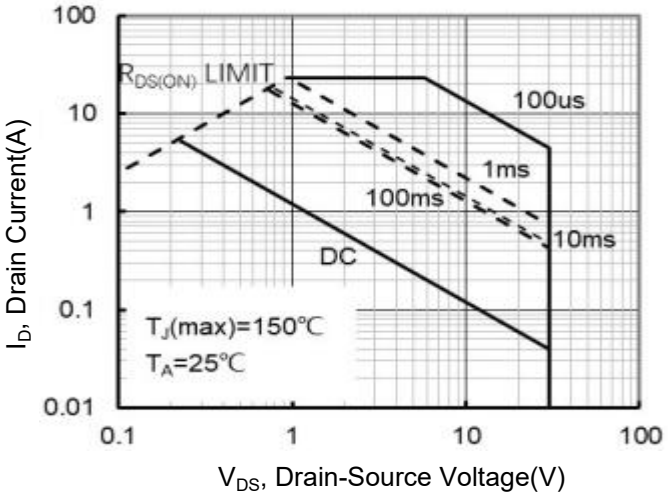
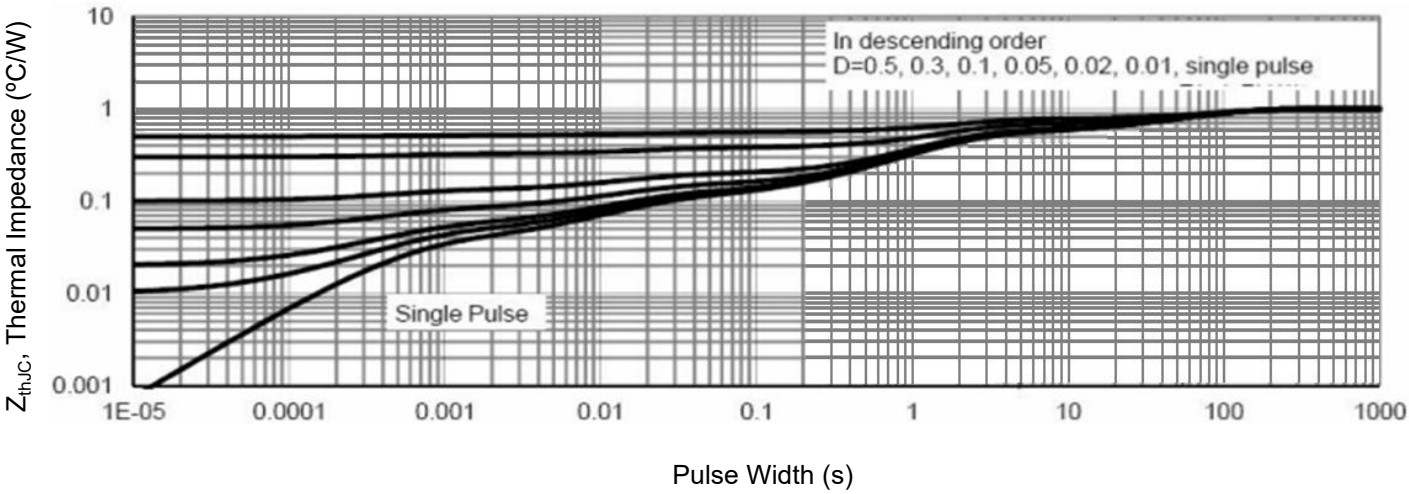
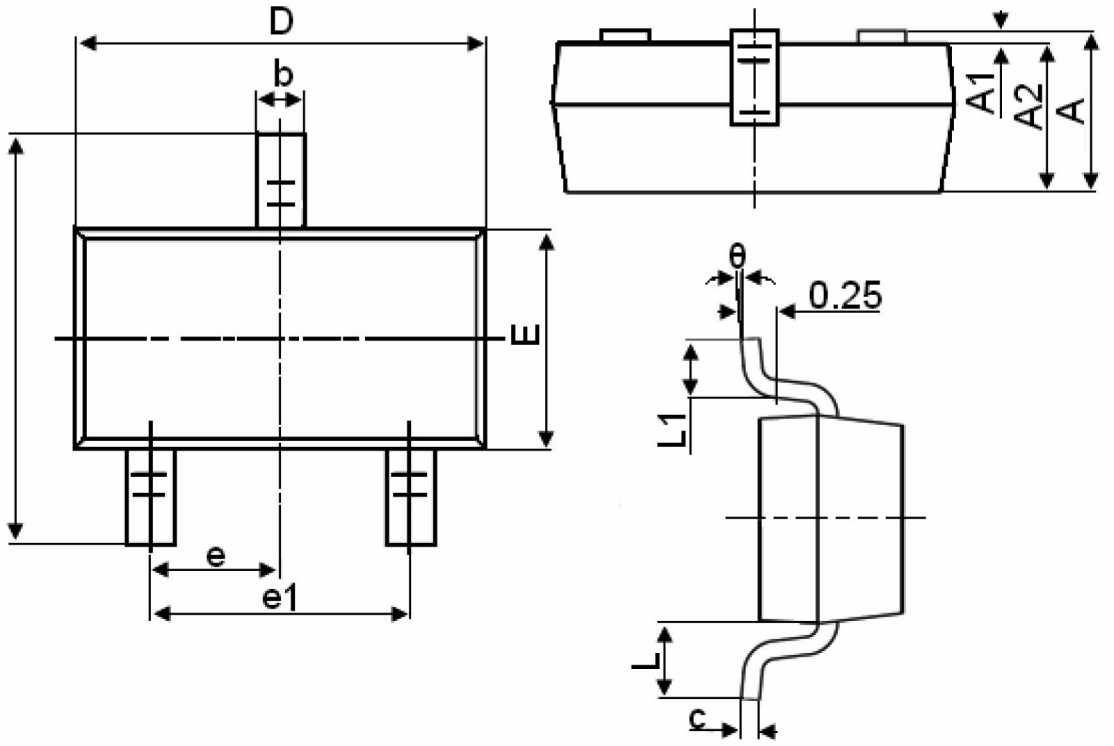



**Figure 9. Normalized Maximum Transient Thermal Impedance**



## SOT-23 Package Information




| Symbol | Dimensions in Millimeters | |
|---|---|---|
| | MIN. | MAX. |
| A | 0.900 | 1.150 |
| A1 | 0.000 | 0.100 |
| A2 | 0.900 | 1.050 |
| b | 0.300 | 0.500 |
| c | 0.080 | 0.150 |
| D | 2.800 | 3.000 |
| E | 1.200 | 1.400 |
| E1 | 2.250 | 2.550 |
| e | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.500 |
| θ | 0° | 8° |